

# Lighting for Historical City: An Example of Safranbolu

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**Abstract**—Lighting is one of the most essential needs for human being. A number of developments have occurred in the sector of lighting since the invention of the light bulb. The importance of lighting applications for perceiving the city silhouette and that for the aesthetic and functional necessities of natural and cultural landscape elements has increased.

Historical cities have carried the traces of different cultures and life's and the character of the cities with details and because of their rich formation including general silhouettes and different styles and forms, the historical cities have been the indicator of the creativity of the societies. The city of Safranbolu a historical Turkish city having an international importance, due to its social, cultural, scientific and economic aspects which has been designated by UNESCO as a city of world heritage for its historical, natural, architectural and urban characteristics.

In this study, that integration of natural areas with architectural elements composing the historical landscape of the city and that contribution to the silhouette of the historical city functionally by emphasizing the architectural individuality and esthetical value of it is intended by proposed lighting procedure with lighting devices. For that purpose, a lighting procedure is proposed for perceiving the city of Safranbolu which has a rich cultural heritage with natural and historical properties in the landscape context.

**Index Terms**— Historical cities, world heritage, Safranbolu, landscape, lighting.

## I. INTRODUCTION

Light reflecting life and confidence provides continuation of social relation and provides orientation of eye by defining the border of the space. By this way, it provides to perception of details of the space. Lighting of the urban space and exterior parts of the architectural buildings increases visual comfort on the people during perception of the physical environment.

The perception of the space at night is possible by the way of perception of physical environment as a whole. Proper lighting of the historical urban pattern is essential in the context of history and culture and providing continuity. Has an importance of introduction and improvement of these values. Unfortunately, in most of historical cities perception of the silhouette of the physical environment at night is inadequate.

That the perception of unique architectural buildings and the city silhouette that represents the historical cities is very

important in the sense of the maintenance of these values. For this reason, it reflects the image of historical cities which has cultural and environmental meaning with some kinds of light, scale, proportion, space movement, contrast, texture and aesthetic [2].

All parts of the Anatolia are covered with rich, natural and cultural values. The physical view, rich formations and skillfully details contain aesthetic and also functional factors of historical cities. As well as its reflection of materialistic and moral historical values until these days, Safranbolu has the evidence of Anatolian civilizations is a good example for historical preservation.

Cultural heritage inherited from early generations can be protected and kept alive in the process of changing. Providing protection and development balance, emphasizing identity of historical city of Safranbolu had the view of Museum city and included in the world heritage list by UNESCO and contribution to city silhouette by suggestion for urban spaces and architectural buildings is aimed. For this purpose, the effects of the lighting being done and should be done in order to transfer the town Center-Carsi, Safranbolu to new generation by protection and development on the silhouette and perception of the city are examined and some suggestions are improved.

### A. Urban Environment

Man has been interacted with its environment for different purposes since its occurrence. The biggest physical indicator of this interaction exists in cities. Urban environment composes continuity with not only its material values but also its secret meanings and buildings being symbol.

Cities get value and meaning according to approaches, necessity of people and richness of their perception. For this reason, not only functional and aesthetic spaces effecting people in physical and psychological manner but also, sensible spaces for environment and nature are required. Environments having aesthetic quality are important in the aspect of physical and sensorial perception composed by it on the people, cultural contentedness and visual comfort [3].

There is a strong relation between environment and perception. Urban environment and its components are perceived in their functional and visual quality according to people cultural values and their individual attitudes besides cultural factors, topography, climate, environmental values, etc. are effective in the perception. The visual value of the environment renders it livable [8].

Night lighting of the city and its silhouette is important for composing an environment suitable for social structure and identity with sensibility of aesthetic of nature in respect of balance improved by person and society in order to maintain their life in well conditions.

*B. Importance of Historical Cities*

Historical cities providing to maintenance up to now and to transfer facts of early civilizations; such as, custom, life style, thought, art to next generations, transfer the architectural heritage, physical view, life value and aesthetic sensibility of civilization as a symbol.

Historical environment is a pattern sheltering various arrangements with its general fascinating view, various rich formations, narrow circuitous streets giving chance of fine surprises and attentive workmanships.

There is a balance between proportion and dimension in historical environment and architectural buildings. Instead of residential buildings common buildings having symbolic values were built bigger with more careful workmanship and high quality and sustained materials. City silhouette characteristic for the city is composed by togetherness of elements dominant to the general view of the city. This is the most significant properties of the city landscape [4].

By restricted perception of the historical environment, i.e. considering the historical city without its surroundings, buildings constructed recently around the historical environment have negative effects on the perception of the historical city and the city silhouette

Contemporary culture is a value actuating sense and thought, admitting of a more creative medium with using whole potential of history. In order to emphasize existence of historical city, it should compose entirety with its buildings and environment in consider with continuity principle.

With respect to natural system and its process in the uniqueness of the city, it is obvious that functional, economic, aesthetic values and space quality in city get importance in relation with lighting design. Thus, this begins to be a connection for gaining of values; such as, identity, consciousness of being citizen, aesthetic evaluation to urban life [6].

*C. Lighting Practices Using In Historical Cities (The Quality and the Quantity of Lighting)*

Lighting of historical spaces and buildings in a good and right way is very important for introduction of cities nowadays and increasing reusability of them. Suitability of lighting projects of historical buildings to originality of them, but at the same time using whole chances of technologies is one of the most important factor increasing functionality of historical buildings.

Lightings applications on historical buildings should be suitable for originality, function and quality of building. Night view of well lighted buildings has an attractive effect

on people [7]. While the visualization of the objects is affected with the power, slope, and color of light, diffusion of light is affected by atmospheric conditions [5]. There is a dazzling brightness in lighting area with powered light source. In result of this, realizing the area clear is prevented.

Whole outer lighting lamps whose power is more than 50 watt should be curtained i.e. being not spread light above the plane which is exist. Light diffuse from an armature without curtain illuminates wider area than desired area unnecessarily. Instead of this, it is possible to lighting with less powered lamps through above to below. And also by this way, heat sourced by lighting from above city is decreased [1].

Color of objects, light coming to eye by reflection is related with spectrum properties of light illuminated of the objects. For this reason, careful selection of spectral structure of light is important for the situation necessity realizing colors right and detailed. There should be the lighting in quality of that whole details can be seen easily, surface and texture formation should be realized correctly, their color should be selected well and illuminated objects can be provided to look in a long time not disturbing the eyes [7].

Required strength of illumination of the buildings or objects to be lighted should be identified in lighting quantity. In this situation, illumination quality and quantity reflecting originality of objects should be calculated well. In natural lightings because of people' tendency to warm and saturated colors, this is a very important character for lighting of historical buildings [7].

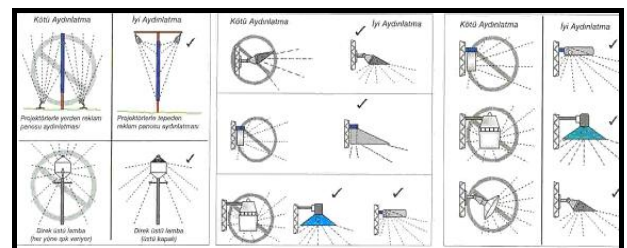


Figure 1 Wrong and Correct Lighting Techniques [1].

Contrast between luminous and obscure areas is used for making transition between different spaces clear and preventing monotonousness by creating surprising effects. Some pointer lightings play an emphasizing role in setting up a physical and visual connection of space.

Artificial lighting applications lately have improved greatly by using improved technological possibilities. In these applications, wholeness in the building has been tried to achieve by producing suitable lighting elements for building whatever quality of the building has been [7].

Urban formations which are not planned, not oriented and not inspected may cause chaos and deformation of the character of the historical structures. For this reason, lighting increases life and space value of environment and objects composing it by affecting their quality in physical and aesthetic aspect with formation of design.

In lighting study of historical environments, observation points and city silhouette should be considered. Lighting should be planned in order to let historical settlement be focus, effect of developing structure in environment on silhouette should be prevent, there should be provide a wholeness between natural areas and elements composing architectural pattern.

## II. THE MATERIAL AND THE METHODOLOGY

The city of Safranbolu a town of Karabuk in the west of the Black Sea region is the material of this study. Carrying on the Turkish city culture due to its structural and environmental formation that has been constructed for hundreds of years, the city of Safranbolu was selected as a material of this study. Positive effects of the light on the perception and the silhouette of the city, in particular the old district, are the main concerns of this study.

The literature survey on the topics, especially, related to the importance of the perception of the historical cities and that of the cities themselves was performed within the study. The survey also included the lighting applications on the historical cities. Official documents, photographs and field studies performed and the results have been collected and used in the paper.

Existent usage and site areas of the city were examined with the help of 1/1000 scaled protection aimed development plan of Safranbolu supplied by Safranbolu Municipality.

Using the observations, suggestions will be proposed for preserving and increasing the importance and characteristic properties of the historical and cultural assets of the city with proper lighting procedure.

## III. THE NATURAL AND CULTURAL CHARACTERISTICS OF THE CITY

Safranbolu is a sample city reflecting all the qualities of the traditional Turkish social life and preserving the cultural legacy created through its long historical past, within its environmental texture.

Throughout the history, a number of civilizations lived in the region where the urbanization is estimated to begin at around 3000 B.C.



Figure 2 General view of Safranbolu



Figure 3 A view from Safranbolu

There are hills and mountains where the district is located. The lowest point is 300 meters and the highest point is 1750 meters high. The lowest point in the district Center is 400 meters and the highest point is 600 meters. The area of the district is 1013 km<sup>2</sup> and a big part is covered with forests. Also the canyon forming a natural beauty makes the region attractive.

Being a typical Ottoman city survived on East and West Caravan route after the construction of the railways in 17<sup>th</sup> century, Safranbolu was declared as an “urban site to be conserved” and was included in the “World Heritage List” by UNESCO in 1994 [10].

Safranbolu has 1200 historical traces of total 40000 historical traces under protection throughout Turkey. The Safranbolu houses are detached houses each of which has a large garden separated from the street with stone walls. The curvy streets, the blind alleys, the town Centre-Carsi, the shapes, sizes, designs and interactions of the houses/buildings form the character of the city.



Figure 4 A views from Safranbolu.

The most important thing that brings Safranbolu to the forefront in Turkey and the world is the Safranbolu houses which are an example of Turkish architecture. These houses are important due to their place in urban life and their architecture. In other terms, the Safranbolu houses are important structures of the Turkish urban life culture of the



18<sup>th</sup> and 19<sup>th</sup> century which had been formed for centuries and continue to survive in our modern urban life.

The Safranbolu houses are designed and built by considering the “respect for the environment” principle. The houses were designed such that both of the official buildings, the mosques and the work of arts of the city are in the view of the houses.



Figure 5 A view from the Safranbolu Gümüş District (day time)



Figure 6 A view from the Safranbolu Gümüş District (night time)

It is possible to see the historical buildings in its original environment. Cinci Inn, Cinci Bath, Köprülü Mehmet Pasha Mosque, Kazdağlıoğlu Mosque, İzzet Mehmet Pasha Mosque, Dağdalen Mosque, Tokatlı Bridge, İncekaya Aquaduct (arch), Clock Tower, Historical Fountains, Hidayetullah Mosque, Bazaars, arches are examples of the historical buildings [8].

Although there are exists lighting plans for the museum houses and preserved government houses a specific lighting plan in the sense of landscape has been prepared neither for the whole city nor for the other architectural buildings. It is not possible to perceive the whole city and the silhouette of the city at night. The traditional houses of the urban life in between the streets cannot be perceived in the darkness of the night. The present lighting materials either have a planned order and a color harmony. Consequently, the lighting poles in the streets cause visual pollution also in the daytime. They are one of the major obstacles for the perception of the historical buildings and thus the city. This situation has a negative effect on the continuity and the presentation of the city a world heritage.



Figure 7 One of the electric poles in the city.



Figure 8 One of the preserved streets: Safranbolu Mescit Street

#### IV. RESULTS AND SUGGESTIONS

Darkness seems to be a problem in the sense of perceiving the open lands and the architectural buildings and also that of living on the land. However, by using appropriate lighting techniques it is possible to emphasize the form, silhouette and the geological structures of the city in the darkness. Since lighting allows the designers to create different emphasizing points on the silhouette of the city, correct lighting provides correct perception of the city.

Besides the important lands and objects, we focus on the less important lands and objects in the daylight. This complexity avoids someone to focus on the actual objects or targets. The confusing effects of the modern day structures can be suppressed by focusing the light on the actual objects and keeping them off the background in the darkness.

Lighting applications applied on open lands and architectural structures in the historical cities increase the efficiency of the use of the building and that also effects the perception of the whole city. The correct selection of the quality and the quantity of the lighting in illumination of the historical buildings is very crucial for the functionality of the building. These two lighting criteria should be paid attention

especially in the lighting applications of the historical buildings.

Visual and physical adequate of the historical city includes esthetical and functional elements that specify the characteristics of the city. These elements correspond to the perception of the protection region, viewpoints, altitude, silhouette of the city, street-house texture etc.

It is convenient to use hot colors in lighting the outer parts (such as stone walls) of the buildings. The purpose is not the homogeneous illumination of every part of the building instead, it is the creation of an adequate ambiance for the proper use of the building [7].

That changing the direction of the light from the sky to the land prevents a light dome formed over the city which causes an artificial increase in the temperature, and thus that prevents possible early aging of natural beauties.

The lighting plans applied on and around the town Center-Carsi should be considered the architectural and historical characteristics of the city, i.e. it should have a balance between the elements of architectural structures and that of the place. Finally, this balance should also contain general characteristic of the city.

The lighting of the open lands around the buildings and the city allows the perception of the historical elements of the city and make them attractive. This emphasizes the character and the importance of the architectural buildings and open lands of the city.

By approving extra lighting schemes, characteristic and publicly used buildings can be highlighted among the others. The open lands, public buildings, museum houses and the registered streets of the city should be lightening with adequate strength of illumination.

A lighting line should be constructed on the peripheral roads of the city and especially the mother roads to the city should be lighting such that the visitors easily realize that the road take him or her to a world heritage. With the construction of the view points and terraces the historical city landscape and the beauty of the city may better be perceived. Besides increasing the attractiveness, a focusing point for the panorama of the city can also be created by lighting the Hidirlik hill.

Natural characteristics, flora, topographic and geologic structures and characteristics, angle and direction of the tilts of the city are important parameters of the quality and quantity of lighting and they should be concerned and optimized in lighting applications.

The viewpoints should be constructed so that they become the limit for the upper sides of the light spectrum of the lightened objects. The horizontal lines of the light adjusted to allow the perception of the whole region.

A light spectrum composed of the light of daylight-yellow color focusing, from the cliff, on the Center of the city not only allows the complete view of the whole city but also makes the object less complicated but more attractive. With such lighting system providing shadowy illumination, it is possible to get out of the most of the lighting poles and the electric wires and thus the city will continue to keep on its own historical view.

With cliff hillside illumination, the urban site the nature of which has been formed due to its geological structure will be perceived clearly. Also the proposed lighting system, with the lines of the light beam radiated from upwards to downwards, prevents both the dispersion of the light through the sky and an artificial increase in the temperature.

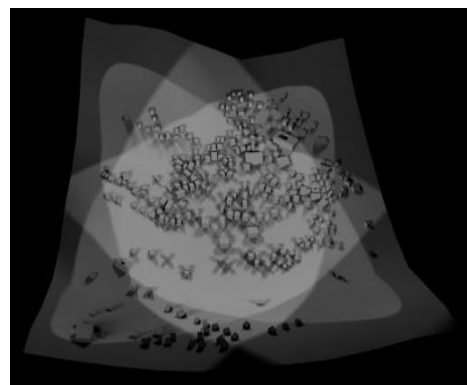
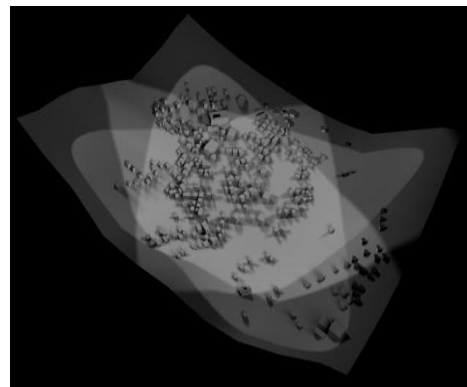


Figure 9, 10. The figure of proposal from cliff

The use of the lands placed on the highest attitudes near the city Centre-Carsi as a residential area damages the historical landscape of city. Images of the modern day houses badly affect the silhouette of city. The negative effects of the newest residential regions on the silhouette should be eliminated using the arrangement of illumination and if it is possible the contribution of these regions to the silhouette of the city should even be suppressed in darkness.

The lighting elements should be selected by considering their esthetical and functional properties. They must be arranged by both making the silhouette of the city, the historical buildings, and the characteristic beauties of the city explicit among the other structures and the design efficient. That using modern armatures within the city not only has an esthetically integration with the proposal of the lighting from the cliff, but also allows the historical structures to be more apparent.

Historical cities with their physical and visual perceptions have an importance in the sense that they make the people psychologically relaxed and culturally satisfied. Light has a contribution to form the esthetic designs throughout the physiologic and emotional needs of the people. The emphasis of the characteristic parts and the perception of the city should be made possible with proper lighting designs. That the perception and the view of the city from all points is very crucial for saving and keeping alive the city.

Forming a continuing culture by using the tools of the modern life gives new solutions to the questions on the concept of lighting of the historical places. The city of Safranbolu reflecting its own qualities to the people by preserving the natural and cultural legacy throughout the history, will be more valuable and perceptible if the beauties of the city can be integrated with the silhouette of the city both in the darkness and in the daytime.

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